

THE KENYA POLYTECHNIC

SURVEYING & MAPPING DEPARTMENT

DIPLOMA IN LAND SURVEY

END OF YEAR I SUPPLEMENTARY EXAMINATIONS

JANUARY 2006

(MAIN EXAMINATION SERIES: NOVEMBER 2006)

PHYSICS

3 HOURS

INSTRUCTIONS TO CANDIDATES:

You should have the following for this examination:

Answer booklet

Calculator/Mathematical tables

Answer any FIVE of the following EIGHT questions.

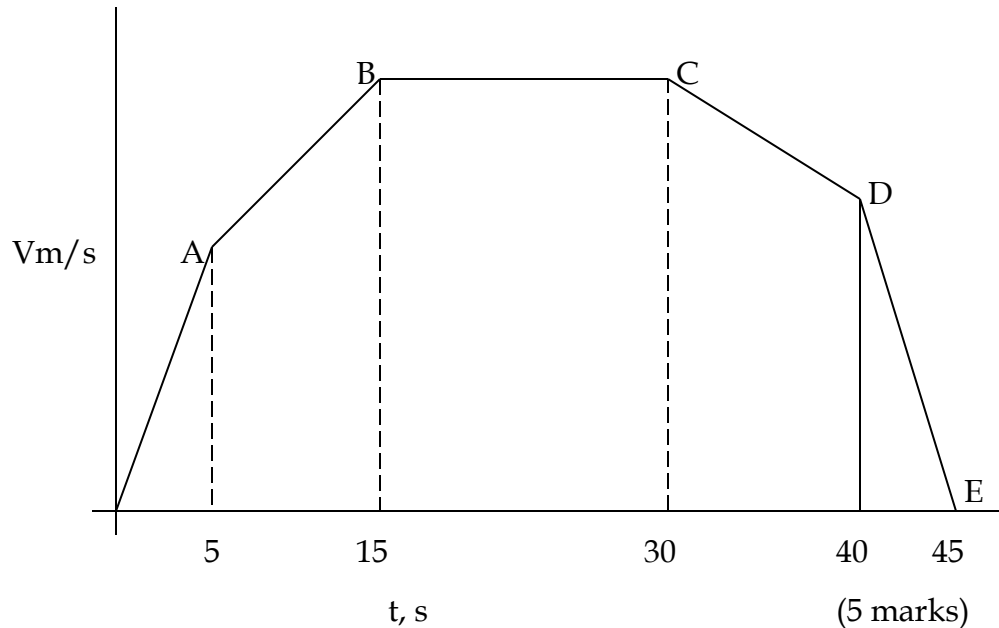
All questions carry equal marks and the maximum marks for each part of a question are as shown.

This paper consists of 3 printed pages.

© 2007, The Kenya Polytechnic Examinations Office

1. (a) If the component of a force 30° from its original direction is 45N , calculate the force. (5 marks)

(b) (i) Interpret the following graph:



(ii) Using the graph, calculate the total distance covered and the average velocity for the journey. (10 marks)

2. (a) Calculate the time taken for a car to accelerate from 20m/s to 25m/s at 4m/s^2 . (5 marks)
- (b) Find the distance covered by the car in (a) above. (5 marks)
- (c) A stone falling from the top of a building takes 30s to land. Calculate its velocity just before it hits the ground. (5 marks)
- (d) Calculate the height of the building in (c) above. (5 marks)
3. (a) Find the radius of a round-about if an arc of 20m covered by a vehicle subtends an angle of 30° at the centre. (5 marks)
- (b) Calculate the radius of the circle described by a 10° pendulum that is traveling at 2m/s . (5 marks)
- (c) If the force of a vehicle accelerating at 5m/s^2 is 2500N , calculate the mass of the vehicle. (5 marks)

- (d) The potential energy of a person on a 20m tall tree was found to be 14,000J. Calculate his mass. (5 marks)
4. (a) Distinguish between distance, displacement and speed. (6 marks)
- (b) Name TWO factors that affect gravitational field intensity. (2 mark)
- (c) Calculate the radius of earth given its mass, $6 \times 10^{24} \text{ kg}$ and $G = 6.673 \times 10^{-11} \text{ Nm}^2 / \text{kg}^2$. (5 marks)
- (d) Account for the differences in the speeds of conduction, convection and radiation. (7 marks)
5. (a) Compare and contrast alcohol and water as thermometric liquids. (8 marks)
- (b) Draw a labeled diagram of a gas thermometer. (12 marks)
6. Outline effects of temperature and their advantages and disadvantages. (20 marks)
7. (a) When 50cm^3 of water are heated over 1000, its volume increases by 1.5cm^3 . Calculate the coefficient of cubical expansion of water. (5 marks)
- (b) A gas at 30°C and 2atmospheres pressure on heating to 60°C and 3atmospheres pressure expanded to 25cm^3 . Calculate the original volume. (5 marks)
- (c) An object in front of a convex lens of focal length 20cm forms a real image 30cm from the lens. Find:
- (i) The object distance. (5 marks)
- (ii) The size of the image if the object is 8cm tall. (5 marks)
8. (a) Using the graph paper provided at the back of your answer sheet, derive diagrammatically the nature and position of the image formed of an object placed 10cm in front of a concave mirror of focal length 5cm. (13 marks)
- (b) Draw a diagram illustrating the function of a simple microscope.